

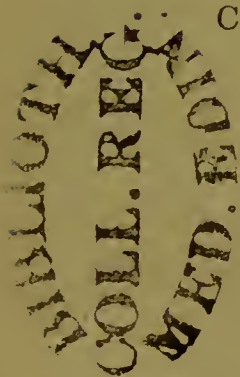
GENERAL REPORT
ON THE
SANITARY CONDITION
OF THE
TOWN OF KELSO.

DRAWN UP AT THE REQUEST OF
THE BOARD
OF
COMMISSIONERS OF POLICE,
BY
CHARLES WILSON, M.D.

Kelso :

PRINTED BY ALEXANDER ELLIOT.

1848.



*To the Honourable the Bailie, and the
Commissioners of Police of the Town
of Kelso.*

GENTLEMEN,

In compliance with your request that I should make a survey of the Town of Kelso, and should draw up a Report regarding its general Sanitary condition, and particularly regarding the noxious influences which might be discovered to exist amongst us, with the view of supplying information which might serve afterwards, under your sanction, as the basis of such measures of improvement and reform as might seem to you justifiable and necessary for the safety of the inhabitants, I now beg leave to submit to you the following observations, the result of an investigation conducted with all the care and attention which I was able to bestow, and which the importance of the duty entrusted to me appeared to me to demand.

In detailing these observations, it shall be my aim to lay them before you in a form as distinct and concise as possible; and I shall therefore abstain from enlarging upon any preliminary topics, such as the general position and arrangement of the town, and its peculiarities of site or of climate, all of which would be requisite for the just comprehension of my subject were I addressing those unacquainted with the locality, but which may be safely dispensed with, at least in their broader features, in a series of statements intended for those as familiar with the more obvious outlines as myself. I shall not fail, however, where the occasional introduction of these topics may appear essential, to make such incidental reference to them as will serve for the elucidation of any remarks or recommendations which I shall consider myself justified in presenting for your consideration, after having gone through the simple detail of what I have seen and observed during the course of my scrutiny.

In nearly the whole of our principal streets the pavement is subsiding into irregular hollows, which, in moist weather, serve as receptacles for mud, and render difficult the process of cleaning. The side kennels are so shallow that they are easily obstructed, or overflowed; and the footways are thus rendered occasionally impassable. In several of the lanes and less important thoroughfares too little convexity has been given to the surface, while the kennels are choked by layers of thick mud, so that there is no proper escape

Streets and
Thoroughfares

during rains for the surface water, and the passages frequently remain for long periods in a wet and foul condition. Much injury, also, is done to the kennels in some parts of the town, by the inhabitants dashing water into them from their houses.

Sewerage. The street sewerage is generally extremely defective. The principal sewer is that which commences opposite the reservoir in the Horsemarket, crosses into the Woodmarket, and passes eastward, close in front of the houses, till it reaches the limits of the town; proceeding afterwards as far as Lodge Loan, along which it descends to the river. During the first part of this course the sewer is close to the surface, and lies nearly horizontal; after its first bend it is still quite superficial, and has only a slightly greater amount of declivity; while, from the extremity of the town to the commencement of Lodge Loan, it appears to have a fall of upwards of three feet. Thence it again proceeds for some space nearly horizontally, and at last terminates with a more rapid descent as it approaches the river. It is flat-bottomed, rudely paved, and therefore defective in form and construction; and its dimensions seem to be as irregular as its grades of descent.—Where it leaves the town I ascertained that it measures about 2 by $2\frac{1}{2}$ feet; at the head of Lodge Loan it is only 21 by 18 inches; and at its disgorgement into the river its aperture appears to have been originally about 2 feet by 14 inches, which latter dimension, however, is at present reduced to 8 inches, through an accumulation of gravel and silt thrown into it by the river. The sewer changes its directions by too abrupt bends; and, owing to this cause, and to the gully-holes opening directly upon it, and dashing in their streams during heavy rains at right-angles to the main current, eddies are created which materially obstruct its course. It is partly in this way, and partly on account of its disadvantageous levels, its contraction at part of its course, and the narrowness of its disgorgement, that the surface water from the streets cannot be transmitted with sufficient rapidity during heavy or protracted rains; so that the whole of the road-ways in the eastern portion of the town are frequently inundated, the water even flowing occasionally into the houses, and standing to a depth of several inches on their floors. The whole of the gully-holes are untrapped, and in warm weather become noisome in the extreme. Part of them are provided with large open cesspools, which appear to serve no better purpose than to diffuse a noxious effluvia in their vicinity; and in this they are materially aided by the imperfect nature of the covering of the sewer itself, through the joinings of which, in many places, the most offensive odours are continually escaping, giving rise in summer to a very serious amount of nuisance and discomfort. The near proximity of the sewer to many of the houses, also, especially if we take into consideration the almost dead level at which it is placed, and the flat and open construction of its bottom, cannot fail to give rise to an oozing of putrid matter beyond its cavity,

impregnating the surrounding soil, and passing through, and under, the foundations, to within the area of the dwellings. Into this very faulty channel, deficient in all the properties of a well constructed conduit, passes the entire drainage, such as it is, of a small part of Roxburgh Street, the greater portion of the Market-place, the half of Bridge Street, and the whole of the Woodmarket and Horse-market, with their connecting thoroughfares.

Beginning at the head of Roxburgh Street, we find the street sewerage proceeding in open kennels till opposite Floors Old Garden lane, where it crosses westward by a covered drain, apparently of deficient size; and, again regaining the surface, passes down the lane as a small, but offensive, open runnel.—We have once more merely open kennels till immediately above the Dispensary, where there are two large, untrapped, and frequently very offensive gully-holes, opening into a covered drain which passes across the street at almost a right-angle to the previous course of the water; so that the direction of the current is here changed in the most unfavourable manner, and consequently, in heavy rains, its flow is interrupted, and the street inundated. Where this drain descends between the Dispensary and the contiguous property, it appears to be defective in construction, and probably also in size, as it frequently overflows to a considerable extent into the Dispensary garden. At the Windygowl, the water from the public well is allowed to take its own course downwards to the river, disfiguring the bank by its broad, irregular, track of moisture.

At the South Butcher Market lane, we have the most recently formed, and, I believe, the best constructed of our sewers; being the only one which has its paved bottom adjusted at an angle, so as to collect the water in a way to give force to the current. In this sewer we meet, for the first time, with an air or stench-trap; but it is a single one, placed near the disgorgement of the sewer at the Pier-head, and of but little service, as other gully-holes are left untrapped, and emit most offensive exhalations. Into this sewer also, which receives the drainage of about a fifth part of Roxburgh Street, the water appears to be delivered at too abrupt an angle.

A third sewer, and the only remaining one of importance, is in the Mill Wynd, down the centre of which it passes, and, bending to the left, has its aperture a short distance below the Mill. In this sewer also there is a single air-trap; attended, like that previously noticed, with but little benefit, because all the other gully-holes are left unprotected, and the currents of air passing between them find ready egress, tainted by the effluvia of the drain. So noisome are these exhalations, that the occupants of some of the adjoining houses are rarely enabled to have their windows opened. Most of the gully-holes, I am informed, are here placed at some distance from the main channel, into which they open obliquely, and consequently at such an angle as to project the water in a direction approaching

to that of the principal current. Notwithstanding this, either from deficient size of the conduit, or from faulty arrangement of the levels, the water does not always find sufficiently ready ingress. The surface drainage from the west side of Bridge Street, a portion of the Square, and the lower part of Roxburgh Street, is received into this sewer.

Thus, with regard to the important subject of Sewerage, we find that not one of the conduits can be considered as fulfilling perfectly the design of an efficient street sewer. They permit the escape of offensive emanations; their floors and walls are generally too imperfectly constructed to prevent the oozing of their putrid contents into the surrounding soil; their forms, their modes of junction, their dimensions, and their levels, are not adjusted so as to transmit their contents with sufficient rapidity; and, beyond all this, they are too superficial to be adapted to receive the sewerage of the adjacent houses, from all of which it should be possible to conduct covered, or tube-drains, into them, in order to avoid the necessity for private cess-pools, the effect of which is to saturate the sub-soil with baneful matters, tainting even our springs, and gradually diffusing themselves everywhere at too near a proximity to the surface to be wholly innocuous in our dwellings.

You will not be surprised to learn, that the announcement, in the public newspapers, of your intention to require a Sanitary inspection of the town, had the immediate effect of awakening in a few of the inhabitants a regard for habits of cleanliness such as they had shewn little zeal in evincing previously; and you will, no doubt, be prepared also to anticipate, that during the time which must necessarily intervene between the period of the inspection, and that in which you may feel called upon to make any special application of your authority, such farther measures will have been adopted as will present matters under an occasionally different aspect from that which I shall now consider it my duty to record. But it is for you to judge what degree of confidence is to be placed in zeal apparently so dependent on a chance incitement: and I have no doubt that you will not permit it to disarm your vigilance with reference to the future proceedings of those, who may appear to have hitherto habitually neglected one of the most important, though, certainly, least understood or adequately defined, duties of a citizen, that of contributing, by every act in his power, to the promotion of the health and safety of the community.

In noting my observations on this branch of the inspection, I shall class them, for your convenience, under three divisions.—In the first, I shall arrange those examples of gross and dangerous nuisance, which appear to demand a more immediate interposition of authority; in the second, I shall include those less clamant cases, where interference is still requisite, but where the nuisance is of a somewhat less aggravated description; while the third will embrace

Sum of defects
of Sewerage.

Back Courts,
Alleys, &c.

Classification
of Nuisances.

such minor instances as are not undeserving of attention, but where interference can scarcely be considered a matter of direct or peremptory necessity.—The principles upon which this classification has been founded, are those which arise from a constantly renewed consideration of the quality and extent of the nuisance itself, the amount of freedom of ventilation, the degree of proximity of occupied dwellings, the condition of the surface as to pavement and drainage, and the probabilities of increased intensity from the co-existence of other nuisances nearly contiguous.—It will be sufficient to indicate in the body of the Report, merely the general position and nature of the nuisance detected.—For the designation of the particular localities I refer you to the appendix.*

CLASS A.

- No. 1. (V. Appendix A.) A stable or byre, at the end of a narrow passage, containing 2 cows and 3 pigs; and with a dunghill, in a bend of the passage outside, piled up to the eaves. The space, too contracted in dimensions, filled with putrid and putrescible matters, and without ventilation, cannot be otherwise than a source of offensive emanations, and is not fit to be occupied for its present purposes. Only separated from it by a wall, is Class A.
- No. 2. A close, with a large dunghill, 12 X 8 feet, with stagnant filth, shewing defective drainage; and a barrel occupied by 3 pigs. Newts are said to crawl from the liquid impurities into the adjoining houses. No. 1 and 2, placed thus in such close contiguity, appear to me dangerous nuisances.
- No. 3. A court, with stables, &c., containing dunghill with accumulation of not less than 25 cubic yards of manure; and pigsty with five pigs. The effluvia from the stables, combined with that from so great a mass of putrescent matter, placed within a court of limited dimensions, and surrounded on every side by buildings, must undoubtedly prove noxious, especially in hot and moist seasons.
- No. 4. A small court, with pigsty and dunghill.
- No. 5. A court, unventilated, and imperfectly paved and drained, at the back of No. 3; with pigsty and dunghill, and outhouse occupied as a dog-kennel; the whole in a most offensive state. The contiguity of No. 3, 4, and 5 renders them, in the aggregate, a very formidable nuisance, especially as windows of occupied apartments open above them. No. 4, however, considered by itself, might have been ranked in the second class only.
- No. 6. A back court, a few feet square, completely surrounded by buildings, with dung-pit, foul and ruinous privy, and outhouse containing pigsty. The windows of adjoining house overlook this pestilential funnel.

* It has not been considered necessary to publish this Appendix, which remains in the hands of the Commissioners.

- No. 7. A pigsty, and stable, placed below occupied dwelling-houses; a byre, and a large accumulation of dung under a window which cannot be opened on account of the effluvium :—the whole in a most ruinous, filthy, and offensive condition.
- No. 8. A small, unventilated, and insufficiently drained, court, about 15 X 10 feet, occupied almost wholly by a dunghill, and with stable and pigsty :—foul and offensive.
- No. 9. Premises occupied as a slaughter-house. They had evidently been very recently cleansed, but were still full of the most noisome effluvia, and appeared wholly unventilated.
- No. 10. An accumulation of refuse, and manure, covering upwards of 30 square yards; with half liquid and stagnant filth.
- No. 11. A large dunghill, with adjoining pigsty, at a short distance from the preceding. At the time of my visit, the exhalations here were exceedingly fetid, as might have been expected from the extent, and near proximity, of two such masses of foulness.
- No. 12. A slaughter-house, in a narrow passage, with two dunghills, and pigsty, adjoining. The contracted and unventilated locality, with dwelling-houses only a few feet apart from these complicated nuisances, is unfit to be occupied for its present purposes.
- No. 13. Another slaughter-house. rudely paved, and with its kennels so arranged that it cannot be kept in a sufficient state of cleanness. The stench, therefore, in the place itself, and at the sink communicating with it, is often exceedingly offensive, and cannot fail, from the known effects of such emanations, to give an increased putrefactive tendency to the meat in hot weather. This might be obviated, however, in a great degree, and the nuisance reduced to one of the third order, by having the whole surface flagged, with proper declivity and runnels, so that it might be thoroughly cleansed daily; and by, farther, having its sink protected by an efficient stench-trap.
- No. 14. A small court, with pigsty, and two dunghills; the whole in an offensive condition, and with defective drainage.
- No. 15. A dunghill, in a line with the houses of the street; from which it is not sufficiently screened to prevent an appearance of discreditable filth and meanness. As the refuse here rests against the wall of a neighbouring proprietor, and as the impure damps proceeding from it have made their way into the interior of his premises, I cannot regard this dunghill otherwise than as an unwholesome, as it is certainly an unsightly, nuisance. Of course, in every other instance where a dunghill rests against the wall of a dwelling-house, or of a workshop habitually occupied, and where the tainted moisture from it has penetrated, or will infallibly penetrate, into the interior, diffusing noxious matters through its atmosphere, I shall, in the same way, feel compelled to point it out as a nuisance undoubtedly prejudicial to health.

- No. 16. For the reasons just stated, the large dunghill, with privy attached, leaning against, and immediately under the window of, an adjoining house, must be considered an unwholesome nuisance.
- No. 17. A narrow court, with pigsty and dunghill, in a locality too contracted to be occupied for such purposes.
- No. 18. A pigsty, and dunghill, placed against the wall of a house, through which the moisture penetrates.
- No. 19. A large dunghill, covering a space of 8 square yards, in a small close; and a byre, without proper ventilation or drainage. The slime from the dunghill penetrates through the wall of an adjoining house, and is complained of by the tenant as a grievous nuisance.
- No. 20. Two large dunghills, contiguous, with privy, covering a space of 15 square yards, and with filthy ooze running through passage of house; occasionally very offensive.
- No. 21. Close, with large dunghill, upwards of 10 square yards, pigsty, and abominable and ruinous privy; the drainage very defective, with stagnant filth diffused over the road, notwithstanding the dryness of the weather.
- No. 22. The damp from a dunghill and pigsty passes into the interior of adjoining house.
- No. 23. A dunghill, several feet deep, receiving the rain by a spout from the back of the house, causes a moisture which oozes through the wall, and can be traced for several feet along the floor of adjoining apartment. On the same property, a stable, pigsty, and privy, leaning against the wall of adjacent dwelling-house.
- No. 24. A large and deep dung-pit, containing a great accumulation of offensive matters; with exhalations so noisome that the occupants of the house nearest adjoining are rarely enabled to have their windows opened. Other similar collections are in the close vicinity.
- No. 25. Dunghill and stable, in narrow, unventilated court. The dunghill is placed against the wall of a dwelling-house, through which the damp has penetrated. The only drainage appears to be by an offensive gutter running through the passage of house. This locality, from its contracted limits, is wholly unsuited to the purposes for which it is occupied.
- No. 26. Dunghills, containing, apparently, nearly 30 cubic yards of manure, with drainage through offensive open runnel:—certainly a hazardous accumulation to exist in a narrow court, in the close vicinity of several dwelling-houses.
- No. 27. A wide accumulation of manure, covering a space of upwards of 150 square yards; with fetid and stagnant water.
- No. 28.—A large dunghill, with open drain, containing impure, stagnant water.
- No. 29. A court, with large dunghill; and 4 pigsties, each with

deep accumulation of putrid matters, noisome in the extreme. The pigsties are separated by a wall only from No. 28, and thus constitute together a formidable nuisance. The disturbance and removal of these foul masses, which can only be accomplished through the passage of the house, must diffuse an intolerable amount of poison and stench.

- No. 30. A very offensive pigsty, wholly inclosed, and without ventilation. There is here, also, a large, unseemly dunghill, containing many cubic yards of manure, separated by only a few boards from a public thoroughfare.
- No. 31. Close, with defective paving and drainage, containing stables, with pigsty, and three dunghills.
- No. 32. Immediately adjacent to the preceding, a tenement with shattered roof, occupied by several families, ruinous, and defiled by damps and ordure. The contiguity of 32 to 31, stamps the nuisance more decidedly with the character of danger.
- No. 33. A dunghill, containing not less than from 10 to 12 cubic yards; with imperfect drainage, passing through open channel in passage of house. In summer, the effluvium here is frequently highly offensive.
- No. 34. Two large accumulations of filth of every description, in a small court in which are two stables. The tainted damp from one of the dunghills penetrates into the adjacent dwelling-houses. This place was in a peculiarly disgusting state at the period of my visit.
- No. 35. A stable under a dwelling-house, with dung-heap in its interior, in a most foul condition; situated in an unventilated court of a few feet in breadth, and having an offensive open channel through passage of house into street.
- No. 36. A dunghill resting against the wall of an occupied dwelling-house. The house here referred to, and that over the stable in No. 35, are both alike unfit, from other defects, to be occupied as human residences.
- No. 37. A close, a few feet square, receiving the rain from several roofs, choked up by rubbish, and with no apparent outlet for drainage. The water, consequently, during heavy rains, passes into the tenement of a contiguous proprietor, from the floor of which it is said to require occasionally to be lifted out in pailfuls; constituting, undoubtedly, a nuisance favourable to the production of disease.
- No. 38. In an area of about 60 square yards, unpaved and undrained, surrounded by stables and dwelling-houses, are three dunghills covering the greater portion of its surface, and margined by stagnant filthy ooze. In heavy rains, I was informed, the liquid nastiness flows into the house, and requires to be lifted out.

No. 39. A court, of under 30 square yards, in proximity to No. 36, undrained, contains 2 pigsties and large dunghill, in an offensive condition.

No. 40. A pigsty and dunghill laid against the wall of contiguous proprietor, so as to cause the extension of impure damps into an occupied apartment.

CLASS B.

No. 1. (V. Appendix B.) A large stable, containing occasionally nearly 30 horses, having in its interior a privy, and a place boarded off as a dung-heap; without any separate provision for ventilation, so that the offensive effluvia are distinctly perceptible in the dwelling-rooms placed in the upper story. Class B.

No. 2. Large dunghill, capable of containing about 50 cubic yards, placed near the windows of adjacent dwelling-houses. The amount of accumulation here constitutes it an unquestionable nuisance.

No. 3. A narrow, unventilated court, with foul privy and dung-pit.

No. 4. Small, ruinous looking court; with stable, pigsty, and dung-hill.

No. 5. A large accumulation of exhausted tanner's bark.

No. 6. Large dung-pit, close under windows of back dwelling-house.

No. 7. Dung-pit, with pigsty and privy, containing offensive amount of accumulation.

No. 8. Two dung-pits, with privy; also with offensive accumulation, and defective drainage.

No. 9. A yard, with large dung-hill, and imperfect drainage.

No. 10. A yard, with extensive accumulation of dung, and very defective drainage.

No. 11. A close, with dung-hill; the latter offensive looking, but not in immediate contiguity with the dwelling-houses.

No. 12. Narrow court, with stable, and large dung-hill, and offensive open channel running through passage of dwelling-house.

No. 13. Two contiguous dung-hills, each in an unpaved court, with insufficient means of drainage.

No. 14. A large accumulation of dung, in a court with defective pavement and drainage.

No. 15. A narrow court, with byre placed under occupied dwelling, without efficient means of drainage or ventilation.

No. 16. A stable, privy, and large dung-pit, in a small court with bad drainage.

No. 17. An offensive dung-hill, privy, and pigsty, in a court without sufficient means of drainage.

No. 18. Court of very limited dimensions, with stable, and a dung-hill immediately under the windows of dwelling-house; sometimes used as a place of deposit for the putrid remains of fish, and therefore, occasionally, very offensive.

No. 19. Considerable accumulation of dung, in a yard with very defective drainage.

CLASS C.

Class C.

- No. 1. (V. Appendix C.) Dung-hill, properly situated, but admitting too great an accumulation.
- No. 2. Byre, dung-hill, and pigsties, generally in an offensive condition, but in an open locality.
- No. 3. Three pigsties, with large dung-hill, in a tolerably open situation, but in which an accumulation is occasionally permitted to an unwholesome extent; and the feter of which, when disturbed for its removal, is said to be extremely disgusting. If this nuisance have any connection with another in a field to the west of the Drying-house lane, it must certainly rank as the very worst of its class.
- No. 4. Back-court, with large dung-hill.
- No. 5. Court, surrounded by stables, &c., and containing four several dung-heaps, with defective drainage.
- No. 6. A stable, with large accumulation of dung.
- No. 7. Pigsties, with dung-hills; one in a covered outhouse, insufficiently ventilated.
- No. 8. Large dunghill, in open locality; but with defective drainage, permitting the impurities to flow irregularly over the court.
- No. 9. A dung-heap, with ashes, vegetable refuse, and ordure, lying in a public thorough-fare, otherwise in an offensive condition.
- No. 10. Open channel from byres, complained of as offensive by the occupants of a narrow alley through which it passes.
- No. 11. Dung-hill, with considerable accumulation.
- No. 12. A close, with two byres, and three dung-pits, closely contiguous, capable of containing 20 cubic yards of manure.
- No. 13. Stable, containing cow and horse, in too limited a locality; and requiring, therefore, great attention in cleansing and ventilating.
- No. 14. Court with two dung-hills; defective drainage.
- No. 15. Manure, and house refuse, covering a surface of about 25 square yards.
- No. 16. Back-court, with offensive dung-heap.

It is obvious, from these noisome details, that my mission, as was to be anticipated, has guided me neither among the amenities nor the elegancies of our native town: yet the period at which I was called upon to make my inspection was one not likely to lead to an exaggerated view of any general inattention, on the part of the inhabitants, to those proprieties of external life which mark an advanced stage of progress in civilization and intelligence. The weather was fine and dry, with cool and bracing airs: and I felt frequently constrained to confess, from the recollections of past experience, that

had the time of my scrutiny been during the moist heats of autumn, it would have been necessary to have given a still more unfavourable description of many of the localities. Those who lived in the vicinity of some of the grosser nuisances complained to me vividly of the annoyance which they endured from them during the warmer seasons, and at those intervals when the putrid masses were temporarily disturbed while carrying them away as manure.

A fruitful cause of the introduction of disease into a community, is the existence of common lodging-houses, open for the reception of those wanderers who are continually moving from place to place, with every aim but that of honest industry. I have examined, as part of my enquiry, into the economy of these establishments as they exist in Kelso, and find them well entitled to the designation, ordinarily bestowed upon them in other towns and cities, of hot-beds of infection. Indeed, were it not that the visits of those who resort to them are usually of a very transitory description, the facilities which they might afford to the production and dissemination of disease would constitute them nuisances of the most alarming and fatal description. Individuals, prone, from the habits of a life of mixed poverty and intemperance, to the incursions of epidemic disorders, are crowded in these places to the number of 15 or 16, or even more, in a single apartment, with frequently three or four in a single bed. In one of them I computed, that, when the apartment was occupied to not a very extraordinary extent, the quantity of space allowed to each individual was somewhat under 70 cubic feet. In another, a garret with a single window, the beds in which were mere pallets on the floor, the space for each occupant must have been occasionally limited to 75 cubic feet. In a third, the allowance for each appeared to have risen as high as 95 feet; but the window was represented by a single aperture, not exceeding 2 feet square, looking out on a dead wall about 18 inches distant. An outer door of this establishment, opening into a foul area (14, Class A.) was hanging in fragments, its pannels partly filled with tattered canvass. A fourth establishment, on a greater scale than the rest, usually makes up 16 beds; and, in seasons of extraordinary vagrancy, five can be added in a dingy garret, making a total of twenty-one. Here, also, three, and even four, occasionally sleep in a bed; and one of the apartments, when occupied to the fullest extent, would afford only about 60 cubic feet to each of the inmates. When we consider, that every adult individual requires daily from 600 to 700 cubic feet of pure air for the sustenance of life, and that the mere accumulation of animal emanations is, in itself, highly prejudicial, we see at once to what depressing and vitiating influences the occupants of such apartments must be frequently, if not habitually, subjected; and that, were it not for a certain extent of ventilation, and a renewal of air, however scanty, life itself must terminate in a

Lodging
Houses.

few hours under conditions so directly incompatible with its persistence, while, even as it is, the more insidious effects of an imperfect renewal of the circulation, and a consequently low condition of vitality, must necessarily still remain to weigh upon the system.

Dwellings of
Labouring
Classes.

But even in the ordinary habitations of many of our artisans and labourers, we encounter a disregard, scarcely less conspicuous, of many of the conditions essential to the preservation of health. In one, a family of nine persons was huddled into a residence, which admitted only 141 cubic feet for each; in another, where the occupants were eight in number, the space allotted for each was 168 cubic feet; in a third, a family of twelve had a space of under 150 feet for each; and in a fourth, where the head of the family was only in occasional employment, and generally in poor circumstances, the inmates, six in number, had each only a breathing space of 146 cubic feet. In the first of these families, nearly all the members have been liable to frequently renewed accessions of disease; in the second, fatal fever has occurred; in the third, fever has recently affected three of the inmates; and in the fourth, two individuals have perished within the last eight months, precisely from such disorders as were likely to be generated in the midst of the darkness, humidity, and impure atmosphere, which were the unhappy characteristics of their dwelling. Previous to the reduction of their numbers by death, the space allotted to each of the last mentioned family was under 110 cubic feet.

Workshops.

And even in the best of the residences of our artisans, the average amount of space for each occupant can rarely be estimated as exceeding 280 cubic feet. It is, of course, at night, during the hours of rest, that the ventilation of all such dwellings is ordinarily at its minimum; while during the day it is too frequently, owing to defects of construction, supplied by the rushing of draughts, rather than by that gentle diffusion of air which is the only safe means for its renewal. In a few of our work-shops, especially of tailors and dress-makers, I believe that even the lowest of the dimensions quoted is sometimes fearfully curtailed; while the flame of one or two gas-burners adds occasionally to the deterioration of the atmosphere. I feel compelled to adduce, also, that otherwise excellent institution, the Roxburghe School, as an instance of over-crowding, and of defective ventilation, which cannot fail to have a depressing influence on the health and vigour of the pupils. Our principal parish schools have, fortunately, been lately re-constructed, under the directions of the Heritors, on an exemplary plan of salubrity and convenience.

Schools.

Supply of
Water.

Without referring, at present, to the arrangements under which the town is provided with water, it is certain that, in point of quantity at least, the existing supply, amounting to about seven gallons daily from the reservoir for each individual of the population, appears to be amply sufficient; and that of this quantity, indeed, fully one-half is now unemployed, and allowed to run to waste from the

cistern. But even, if, with better views regarding the salutary effects of public, domestic, and personal cleanliness than seem to be now prevalent amongst us, a demand should arise for a still larger supply, it could fortunately be obtained, without difficulty, to double or triple the present extent, from pure and copious springs existing in our near vicinity, or even within the limits of the town itself. In this important respect, the town, from its geological position, resting on an extensive bed of alluvial gravel, within a circle of gentle acclivities, is more favourably situated than in some other points to which it may be necessary to direct your attention afterwards.

However individuals may be inclined to cavil on minute points of distinction, there have always been few who have refused to admit the broad fact, that masses of impure substances, diffusing their emanations in the midst of a population, have a most baneful influence on the general health. The popular belief has usually limited this prejudicial effect to the propagation of certain diseases of an epidemic character, and chiefly of the various forms of fever; while a wider, and more reasonable, view brings before us a far more extended field of human suffering, as the result of the existence of these sources of contamination, and of the habits which they imply. Neither natural phenomenon, nor natural effect, has ever been found to depend for its being on a single condition, or a single cause. Whether the disease appear to owe its immediate origin to putrid miasms, or to the action of what have been termed the volatile contagions, or to both in conjunction, these agents, nevertheless, cannot be considered as actually sufficient of themselves to establish its existence. Certain predisposing, or collateral, causes are required to give full effect to the virus; and where these are feeble, or absent, the poison becomes comparatively innoxious. It is thus that, in an epidemic, many escape the infection who have been constantly exposed to its influence; while others fall ready victims, whose communication with the disease has been only remote or transient. Where intense external causes encounter internal, or predisposing, causes equally intense, the power of the virus is at its maximum, and the ravages of the disease are proportionately destructive.

Effects of
Malaria.

But as these predisposing causes, whether the product of neglect, of deprivation, or of the shocking mischief of intemperance, are simply such as depress the powers of life, and deprive man of his natural vigour, it can excite no surprise that they should induce a proneness to many other diseases besides those of an epidemic character. Thus there is ample proof to shew that serofula, with its wide train of dependent disorders, sea and land scurvy, various forms of indigestion, enlargements of the liver, not rare in this vicinity, consumption, and many others, have all of them a very intimate connexion with the neglect of what are understood as hygienic conditions. Those intercurrent diseases, also, which depend for their dissemination

partly on a fixed, and partly on a volatile contagion, as small-pox, measles, &c., have their forms materially influenced by similar concurrences. But many of these conditions it is in our power to modify in a very important degree: and thus it is, that the ravages of disease become, to a great extent, under the control of well-directed sanitary regulations.

Disadvantages
of position of
Kelso.

There are circumstances, however, of climate and of position, powerful in their deleterious tendencies, over which our influence is of a more limited description: and in this respect the town of Kelso cannot be considered as very advantageously situated. The slight elevation of its site, the masses of wood in its vicinity, the profuse vegetation passing through all the stages of progress and decay, the open and porous nature of the soil especially in parts where it was formerly girt by a line of morasses, with the abundant current of the river, are all of them sources of malaria, in the midst of which we are constantly existing. From a similar combination of causes, our local atmosphere is generally in an unfavourable condition with regard to extent of humidity. Though the quantity of rain, calculated for the four years from 1840 to 1843 inclusive, presents an annual average of scarcely more than 24 inches, the moisture, as indicated by the hygrometer, shews an amount approaching, also at an average, to within 15 per cent. of the state of complete saturation: the average temperature being 46.13, or about 4 deg. below that of London. This degree of humidity, in which the air thus usually contains 85 per cent. of the whole moisture it is capable of absorbing, generates, with the aid of the other circumstances previously noted, a tendency to the formation of maladies of an asthenic, or low and malignant, character; of which we have a general proof in our comparative exemption from diseases of a purely inflammatory type, and an individual calamitous example in the form of scarlet fever at present prevailing amongst us. As to the more especial influence of the river, it has frequently appeared to me, that those localities most exposed to its emanations are also those, other circumstances being similar, in which febrile diseases assume the most virulent and dangerous type; but as this view is founded on little more than a vague impression, and as I have not leisure at present to test it by any statistical enquiry, I shall not insist upon it farther than to remark, that it is at least in some measure consistent with what has been observed in other quarters. In the department of Ain, towards the south-east of France, occupied by a community chiefly agricultural, it has been shewn from a remarkable series of details, that, while in the hilly districts the deaths annually were only 1 in 38 of the inhabitants, along the banks of the river they rose to 1 in 26, and in the marshy localities they were as high as one in 20, or nearly twofold the mortality first recorded.

It would be unreasonable to deduce, from these unquestionable

disadvantages of position, any other argument than that which would lead us to compensate for them, by means of an increased vigilance in destroying such other deleterious influences as are more directly within our power. That such influences exist amongst us, in the shape of the imperfections of our sewers, the filth of our courts and alleys, and the deficiency of space, ventilation, and even light, in many of our residences, is sufficiently evident from the details which have been previously submitted to you; and it would be easy for me to add, though it is unnecessary for the general argument, many individual proofs that these influences have appeared to produce, upon our community, the same disastrous results which have been uniformly encountered from their presence elsewhere. Thus, close to an imperfect part of the principal sewer, and in the near vicinity of an offensive gully-hole, I have observed, in a single house, three fatal cases of dysentery; a disease universally admitted to derive its frequent origin from malarious exhalations. At No. 2 (Class A.), there have occurred severe and fatal cases of epidemic disorder. At No. 21 (of the same class), I have seen recently several cases of dysenteric fever. At No. 24 there has also been fatal fever. At No. 28, fever occurred in nearly every apartment of an adjacent dwelling-house, and was fatal in at least one of the instances. Fever, also, with dysenteric complication, has occurred at No. 29: and in the immediate vicinity of No. 38, there has been fatal fever. At No. 4 (Class B.), there has been recent fever; and at no remote distance from No. 6, nearly in the direction of the prevailing winds, it has selected one or two individuals peculiarly predisposed, who have perished from its attacks. At No. 15, there has also been fever. In my notices of the dwellings of the labouring classes, it will be recollected that I cited similar, or at least parallel, instances, and it would be easy to multiply these to a considerable extent from sources of recent experience.

Special results
of noxious
influences.

But there is a nobler and a surer evidence of the benefit derivable from sanatory measures, in the facts which are to be obtained from a comparison, either of two distinct periods of time, or of two distinct classes of the community, placed under dissimilar sanitary conditions. Thus, if we refer to the condition of Kelso and its vicinity, during the period of ten years intervening between 1777 and 1787, we are aware, that whatever defects with regard to general cleanliness may exist now, they obtruded themselves everywhere then in a form infinitely more aggravated; many who are still alive remembering that then huge dunghills encumbered even the public streets, while, close upon the outskirts of the town, circle beyond circle of morasses surrounded it in nearly every direction. It is manifest, that, if it could not be shewn, that diseases of a febrile nature prevailed to a conspicuous extent at this period, the justice of the ordinarily admitted doctrine as to their

Relative
prevalence of
disease at
different
periods.

origin would, at least in as far as Kelso was concerned, be very seriously impugned. But we learn, that fevers constituted then, at an average, 26.76 per cent., or more than a fourth, of all diseases coming under treatment; while in some of the years the proportion rose to a greatly higher extent. Of this amount, 14.05 were cases of ague, and 12.71 of continued fever. Let us now take another decennium, from 1829 to 1839, when public cleanliness was more respected, and the marshes, though still exceptionable, had been extensively drained; and we find ague all but annihilated, and the amount of continued fever reduced to 7.36 per cent., or less than a thirteenth of the general amount of sickness. Nor is our gain in the later decennium limited to this immense reduction. The virulence of every form of disease appears to have received a corresponding mitigation; and the mortality, which, in the first decennium, amounted to 4.6 per cent. of every description of sickness, fell to somewhat under 2.6 per cent. in the second. Scrofulous disorders, as might have been anticipated, were found to have been greatly more prevalent in the former period than in the latter.

Average
duration of life
in different
classes.

To these statements, which have been deduced from materials supplied by the general record of the Kelso Dispensary, and which, of course, relate to the labouring and poorer classes exclusively, I would here add a few others, bearing reference to the average duration of life, as shewn by the ages at the period of death, in two distinct classes, existing contemporaneously, but under circumstances of unequal advantage with respect to hygienic conditions. The interval selected is again one of ten years, terminating with June, 1847; and the materials are derived from the recorded results of my own individual practice during that period. In constituting the classes, I have adopted the simple arrangement of placing in the one category all those who were in the habit of receiving gratuitous medical assistance, and whose command, therefore, of the comforts of life, and of sanitary advantages in their residences, might be naturally considered, as it really was, of a very limited description: in the other, I have arranged those whose more independent circumstances placed them in a greatly superior position, with respect to nearly all those conditions of health usually held to constitute the ground of sanitary enquiry. In the first of these classes, then, I find that the average duration of life was 34 years: in the second, it was 44 years and 13 weeks. In the first, half the number had perished before the thirty-first year: in the second, half were existing beyond the fiftieth. In the first, only 14 per cent.; in the second, as many as 33 per cent., outlived the term of sixty-five. At eighty-five, 1 per cent. remained in the first class, and 3 in the second. At ninety, one only survived of each. Thus, while one hundred of the class possessing the minor advantages lived only an aggregate of 3400 years, the same number of that which was more favourably situated as to sanitary conditions

reached an aggregate of 4425 years ; or exceeded the other by a difference so important as 1025 years.

Two essential elements of a statistical calculation, mass of numbers and extent of time, are here present in a sufficient degree to give tolerable stability to the facts elicited. Brief as the statements are, they could only be arrived at through the assiduous analysis of more than 16,000 distinct entries of cases of disease ; and it will be observed that spaces of ten years have been selected as fair periods to form the basis of comparison. Thus developed, it is interesting to note fact upon fact rising into a consistent series of proofs, each confirming its antecedent, and all tending uniformly to shew how possible it is to diminish the sum of human suffering, and to extend the bounds of human existence, and pointing distinctly to the means by which such desirable aims may be accomplished. I have naturally preferred founding these proofs upon direct local experience, rather than upon that which might have been derived from more distant quarters ; because conviction might have been eluded where the circumstances could have presented only a doubtful analogy, and because the interest thus awakened could only have been remote and qualified. It will be to me a source of deep gratification, should you consider them as fitted to strengthen your position in any effort which you may feel called upon to make for the common welfare.

The measures which it will now be prudent to advise must necessarily have suggested themselves to you during your consideration of the preceding observations. But I shall take leave to direct your attention more especially to certain parts of them, in a concise review of the principal methods which recommend themselves for your adoption. Many of them must unquestionably be attended with considerable expense ; but it is seldom that an important aim can be attained by a trifling effort. Whatever is withheld from the promotion of the public health is, in fact, a stint upon true economy ; for there can be no inmate more costly than the sickness which brings charges upon a household, where it has paralysed the hand of labour. In your selection of proceedings, I trust, that, however slowly and gradually certain portions of them may be carried into completion, they will, at least, all of them be instituted at first on a broad and comprehensive plan :—such as will admit of its parts being successively perfected, without that doing and undoing, in a series of make-shifts, which is ever the most expensive, as it is certainly the least efficient, of all methods of operation.

Our streets, when considered as those of a small country town, are at present distinguished, with the exceptions which I have noted, for a more than ordinary degree of propriety and neatness. It would doubtless, be an important improvement, and one to which most of our streets are well adapted, if flagged footpaths were provided along the fronts of the houses ; of sufficient breadth, and elevated about

Proposed
remedial
Measures.

Improved
Kennels.

half a foot above the common road-way. But the Police Act, as at present administered, does not permit the enforcement of this handsome and convenient arrangement:—though perhaps, on the plea of superior advantages of surface drainage, it might be practicable to have a kerb-stone, of either Arbroath or Caithness slate, placed on edge, carried along the whole of the inner sides of the gutters; within which the common pavement, as at present in use, might be placed, and retained, at a higher level. The effect of this would be, that nearly a right-angled kennel would be formed, of sufficient depth to retain the current of water, instead of the present shallow and expanding channel, admitting of its easy overflow across the footways, and even within the houses. Should flagged footways be adopted at any time afterwards, these kerb-stones will be found to constitute a serviceable part of them.

Scavenging.

It must be admitted, also, that our streets, however far from perfection, have at no period been kept generally in a more clean condition, than under the superintendence of the present contractor. If, during the rule of our ancient abbots, they were regulated by anything like what we find on record as the "*Statuta Gilde apud Berwicum facta*," supposed to date from the middle of the 13th century, in which it is ordained, under a severe penalty, "that no man shall presume or dare to place dung, or rubbish, or ashes on the public way, or in the market-place, or on the banks of the Tweed, to the hurt and damage of passengers," they were certainly better protected then, than in periods greatly more recent to which I have already had occasion to refer. But, even in this department of our police economy, it seems to me possible that not only a more efficient, but a less expensive, mode of management might still be suggested. In several of the cities and towns of England, as in London, Manchester, and Newcastle, the patent street-sweeping machine, invented by Mr Whitworth, has been now for some time in active employment; and with one opinion only as to its superior cheapness, convenience, and efficacy over the usual methods by hand labour. I find that such a machine can be hired from the patentee at a charge of £110 for four years, to be paid in advance on delivery at the works. To this cost of £27, 10s. per annum, must be added an expense for repairs, renewal of brushes, and the hire of a man and horse, which, probably, cannot amount to more than an average sum of £90; making, in all, somewhat less than £120 per annum. At the termination of the four years, the hire of a new machine can either be procured on similar conditions, or, on payment of £80, the old one can be retained for a renewal of the term. With this machine, and a single cartman to attend it, an average of from $4\frac{1}{2}$ to $5\frac{1}{2}$ acres of streets or roads can be swept daily, in a more perfect manner than could formerly be effected by 17 or 18 men. I have forwarded with my report one or two documents more fully explanatory of its method of operation.

The ordinarily excessive humidity of our atmosphere ought to induce in us additional watchfulness, to preserve the surface of the ground, and the foundations of our houses, as free as possible from stagnant moisture, or from the percolation of damp of whatever description. Should these be tainted from external sources of impurity, their noxious influences will, of course, become immensely aggravated; and there can be no duty of sanitary improvement more important, than that which effectually removes them, with the deleterious emanations which they produce, from the midst of a community. For this, the existing state of the sewerage of the town is wholly inadequate, and here, therefore, a principal effort is requisite, which no hesitation as to the necessary amount of outlay ought to induce us to abandon. In this department, especially, it will be prudent to proceed upon an originally well considered and comprehensive scheme, the parts of which must allow of gradual and consistent extension, so that, while the more urgent defects are first corrected, others may admit of remedy as their necessity suggests itself, without any deviation of plan, and with a diffusion of the charges over a greater number of years. The Woodmarket sewer I propose, at once, to set aside altogether, as too essentially defective to be even susceptible of improvement. The Mill-Wynd and Butcher Market sewers may be retained, with a few slight alterations, as subsidiaries to the main drainage.

A first consideration must relate to the new form of sewer to be adopted, and to the materials best fitted for its construction. There can here be little difficulty in recommending the tubular shape, which has been recently adopted with advantage in various localities. These are constructed either of common clay, or of fire-clay, and are moulded of different dimensions; generally in pieces of a yard in length each. As they are connected together by means of spigot and faucet joinings, in the same manner as cast-iron pipes, and are jointed with Roman cement, they can be placed in position with great facility and despatch. Such tubes, especially if of an oval figure, are not only the most favourable for the flow of the water, but also for the effectual transmission of the substances which it ordinarily holds in suspension. Those of fire-clay are reported to be strong enough to sustain a great degree of pressure; some of them having borne as much as 900 perpendicular feet before yielding, and others having been employed, under the action of a forcing pump, for the conveyance of water to the top of a considerable elevation.

A form of sewer suggested by Mr Dyce Guthrie, moulded from fire-clay, and measuring $3\frac{1}{2}$ by $2\frac{1}{2}$ feet, seems to possess peculiar advantages, and is rated at a probable cost of 18s. or £1 per yard. But less than these dimensions, and therefore a smaller amount of cost, would be sufficient for our exigencies. It is manifest, that the facilities for sewerage supplied to a town must be in due pro-

Improved
Sewerage.Proposed
construction
of Sewers.

portion to the quantity of water which reaches its area, whether in the form of rain, or of discharges from natural springs, or from artificial reservoirs and conduits. Two and a half millions of gallons would, it appears to me, be a tolerably wide estimate of the maximum quantity of water thus falling at any time within our area of drainage, in the space of twenty four hours. But we ought to be provided for the delivery of a quantity exceeding this by at least a half, or approaching to four millions of gallons; because we ought not, in prudence, to be considered as allowing any proportion for that which is again instantly absorbed by the earth, or is retained temporarily in the cisterns of the inhabitants, or finds its way to the river by other channels, and because in storms the rain must frequently descend in sudden dashes, requiring more than ordinary facilities for its rapid transmission. Let us concede that the two present sewers, proposed to be retained, are capable of transmitting a fourth part of this quantity, at which they would be considerably under-rated, and we have still a supposed amount of about three millions of gallons for which to provide an exit. But I find that a tube, having an interior measurement of 25 by 16 inches, and moving its current at the rate of only two miles an hour, will discharge, at a computation sufficiently accurate for our purpose, a daily amount of nearly three and a half millions of gallons. It appears evident, then, that a channel of these dimensions, with due attention to the adjustment of its levels, could scarcely fail to suffice amply for our utmost exigencies; and I would estimate its efficiency, with respect to its powers of transmission merely, at twice the extent of that which it is designed to supersede. Were we to confine our estimate to the ordinary functions of such a conduit, apart from the effect of storms and rapid thaws, it is obvious that a much smaller size would be fully adequate.

As to the course of the sewer, it is probable that it will be considered advisable to continue it in nearly its present line eastward: not so much on account of the advantages of the levels, as because it is in this direction that any possible future extension of the town is likely to proceed. A shorter course, certainly, and therefore a less expensive one, might be obtained along Hogg's lane; but, perhaps, the narrowness of the passage here would render it difficult to descend to the requisite depth for laying the tubes. In whatever line the sewer approaches the town, it ought to reach its outskirts at a point as far below the surface as can be rendered consistent with a proper declivity; and not within a few inches of the plane of the houses, as under the present ineffective and pernicious arrangement. Allowing, in this part of its course, a minimum descent of three quarters of an inch for each ten feet of progress, which experience in the sewerage of other towns has proved to be amply sufficient for drains of this magnitude, there can be no difficulty in causing it to enter the town at a distance of not less than

eight feet below the surface of the road-way ; a depth at which the principal sewers of towns are usually placed. This point once attained, an efficient drainage of the town becomes at least a possible circumstance. The sewer can be carried along the centre of the streets, at such a depth, and remoteness from the houses, as to preserve even their sunk stories intact. It must change its directions by gentle curves ; receive its branches by such angles or bends as will serve to project their streams in a direction approaching that of the main current ; and be provided everywhere with a sufficient number of gully-holes, each protected by an efficient stench-trap. A line of common draining tiles, placed along each side of the main conduit, would be valuable for the accessory drainage.

With the progress of knowledge and refinement, when society begins to concern itself as much for life itself as for the means of living, a demand may arise for an extension of the plan of sewerage far beyond what appears to be our present exigencies. This would probably be best answered by the construction of a second principal sewer, proceeding along the centre of Roxburgh and Bridge Streets, and having its vent into the river immediately below the bridge. In the mean-time, however, we ought not to neglect such easy alterations, in this division of the town, as that of widening the drain at Floors Old Garden ; conducting the sewer at the Dispensary, enlarged in dimensions, down the lane in its vicinity, instead of in its present direction ; and altering the position of some of the gully-holes, and protecting the whole of them, whether in this, or in the remaining sewers, with proper air-traps. Lastly, wherever any current of water reaches the surface, whether from the tops of the houses during rain, or from any other sources, it ought not to be allowed to diffuse itself over the road or pavement, or remain stagnant in the closes, but should be conducted at once by a proper runner into the nearest channel.

Minor
alterations of
Sewerage.

There is one feature in the present system of sewerage, and that an accidental one, which I should be unwilling to see abandoned. It consists in the discharge of the waste water from the town reservoir, amounting to many thousand gallons daily, into the main eastern sewer ; the effect of which must be to keep its impurities in a constant state of dilution, and of more rapid motion, or, in other terms, to change it into something less noisome than an extended cess-pool. In the new sewerage, an additional advantage might even be derived from this source. It appears that the cistern is placed at an elevation of about $9\frac{1}{2}$ feet ; that its contents are nearly 6500 gallons ; and that it is provided with a waste-pipe two inches in diameter, communicating with the sewer, and which can be opened at pleasure, to its full extent. We have here, then, in addition to the more gradual percolation already mentioned, a powerful instrument for flushing and cleansing the sewer, at short intervals, by suddenly emptying into its channel, with a forcible current, the

Flushing
Sewers.

whole body of pure water in the cistern. If we could add to this the sewer suggested from Roxburgh Street to the Bridge, and could conduct into it, in a similar manner, the surplus water from the copious springs near Lady Bennet's well, our town might boast a perfection in these points which could not easily be rivalled.

To return to the expense of the form of sewer which I have described, I learn that fire-clay tubes of the dimensions specified, or measuring 25 by 16 inches, and 2 inches in thickness, can be obtained at Manchester for 8s. per yard; and that the cost there of laying them eight feet below the surface is 3s. per yard. At the Garnkirk Brick-works, in the vicinity of Glasgow, tubes, also of fire-clay, 18 inches in diameter, are made at 10s. a yard; but for knees, bends, and branched pieces, one-half more is demanded. They are made of a variety of other sizes, adapted for lateral drainage, down to as low as a two inch bore, which is sold at 9d. per yard. Common pipe-tiles, of an egg-shape, 15 inches in length, and 2 inches bore, may be obtained in some quarters as low as 18s. per thousand. There can be little doubt, that, in this locality, an ordinary built sewer, possessing an equal degree of efficiency with those constructed of clay-tubes, would be from 30 to 40 per cent. more expensive.

In recommending or enforcing the abatement or the removal of nuisances in those instances which may appear to demand your interference, it seems to me that there is no single point more deserving of your attention, than the degree of ventilation which the locality, where the deleterious matters are situated, is capable of admitting; because it is evidently according to the degree of concentration of the noxious emanations that their danger is to be estimated. If we know anything of the nature of these emanations, we know that they are volatile poisons, diffusing themselves from their sources, of whatever description, in all directions, and gradually dissipating themselves wholly where there is free movement of the atmosphere. So apparent is this, that it seems impossible to consider them, at least in this individual respect, as governed by any other conditions than those which attend the diffusion of all other influences emanating from a central point; or, in more technical language, that their intensity diminishes in the proportion that the squares of the distances increase. Thus, if we assign to their virulence, within a foot of the exhaling body, a force estimated as 10,000, at a distance of ten feet it will already have diminished to 100, and at the distance of a hundred feet it will have dwindled to as 1 only; or, it will be ten thousand times stronger at one foot than at a hundred. On the other hand, under the existence of circumstances limiting their diffusion, they necessarily accumulate, and acquire greater degrees of intensity at greater distances; though not without something like the same ratio being constantly preserved. Hence our ordinary fever is seen rarely either with the extreme of severity in

Cost of
Sewers.

Abatement of
Nuisances.

its forms, or of infectiousness in its tendencies, in our more spacious and airy residences ; while, in the close and crowded dwellings of the poor, it increases its strength in the same confined and vitiated atmosphere which depresses the vigour of its victims, and ripens them for its assault. The many hundreds of railway labourers, recently and suddenly thrown upon a population ill-provided for their accommodation, could scarcely hope to escape the influence of infection in the tainted air of their frequently unwholesome sleeping-places ; though their exemption from the sufferings of destitution ought to have placed them, otherwise, in a condition favourable to the preservation of health. To these, and similar, views, there will be abundant room for reference when considering the qualities of the nuisances arranged under the different classes. They will justify you in demanding a complete removal in all unventilated situations, where there are contiguous dwelling-houses ; and in requiring a permanent abatement, by means of paving, efficient drainage, and a check upon undue accumulations, in the more open localities.

The external cleanliness which you are entitled to enforce, will be naturally the first step towards inducing that internal cleanliness, and attention to other sanitary measures, which appear to be so indispensable requisite in many of our dwellings. We cannot propose ventilation to those whose windows open over a mass of putridness ready to pour its pollutions into the apartment ; and where the eye has become familiar with filth under the clear sun-light, we cannot expect it to be fastidious as to that which it observes, or passes over unobserved, in the recesses of a dingy habitation. But public and private decency will always preserve, at least, a certain relation to each other, and habits of self-respect will spring up, and household and personal cleanliness be fostered and appreciated, under the influence of that intelligent zeal which pursues everywhere the opposite defects, when they present themselves abroad, as enemies to the common welfare. Were one or two of the worst description of houses interdicted as unfit to be inhabited, the many who are now content with a low grade of comfort, because they witness the existence of others still lower, would be deprived of this solace to their indolence and apathy : and a better standard of convenience and wholesomeness would be established for the residences of the poor, without any addition to their expenditure, because there is no class of dwellings now usually let at more extravagant rates of profit, than those wretched hovels in which it is impossible for human beings to subsist in safety. As to the common lodging-houses, as these are already especially under your jurisdiction, it is unnecessary to make them the subject of farther reference. On many other points, also, your recently published bye-laws will afford valuable assistance : and I trust that a somewhat rigorous attention to one or two of the minor schools, where no proper provision is made to permit the observance of the commonest proprieties on the part

Promotion of
household
Cleanliness.

Lodging-
houses.

Minor Schools.

of the pupils, will not be considered as beyond the limits of their authority.

Increased supply of Water.

It is understood to be your intention to give every possible facility for a full supply of water to the inhabitants, and that you contemplate the probability of many of them being induced to bring it into their closes, or houses, by means of private water-pipes. It is evident, that, if this desirable arrangement be carried out to any considerable extent, the consumption of water in the town must also become greatly increased; and that a necessity may arise, either for some precaution in checking waste, or for the introduction of a larger quantity, which, we have seen, can easily be obtained. Seven gallons daily, for each individual of the population, we have noted as nearly our present measure, and as much more than sufficient for the actual demand: in other towns, however, where an unlimited supply is permitted within the houses, 12 gallons, and in London even 25 gallons, has been considered a fair average allowance; a fact which it seems proper to submit to your attention. It is, of course, not in the houses that any waste is likely to occur: but in the closes, the stop-cocks are frequently left open; an act of carelessness which it may be difficult to prevent.

Water at high pressure.

Much interest has been excited lately with regard to a system, adopted in various towns, of placing the reservoir at a considerable elevation above the plane of the streets, so that the water is kept constantly in the pipes at a high pressure, powerful enough in some places to project it to many feet above the tops of the houses. The advantages of this are, that not only can water, to an unlimited extent, be obtained for all ordinary purposes in the upper apartments of the loftiest buildings; but the general security is greatly promoted also, as, in cases of fire, powerful jets can be brought at once to bear upon it wherever it may be situated. At Nottingham, for example, the average pressure is 80 feet, the maximum being 120: and water can be raised to this elevation by the agency of steam, and afterwards distributed to every part of the town, at a cost of something less than 3d. per 1000 gallons; a charge which includes all expenses of repairs and superintendence, as well as interest and profit on the original capital.

It will be recollected, that a number of our respectable townsmen made some progress, a few years ago, towards instituting an enterprise for supplying the inhabitants with river water, to be raised by machinery to an elevation within the town. Such a scheme, however, considered merely as an advantageous and profitable speculation, was not likely to sustain itself in a locality where access to pure river water was already so easy, unless it could be connected with some other beneficial project, in correspondence with its aims, and to which its mechanism might be in part adapted. It can be no difficult matter to shew that such a combination might readily be effected; and I believe it to be very

possible, that, at no distant period, a concurrence of circumstances may actually point to its completion. Thus, as the comfort and neatness of the dwellings of the working-classes are often materially deranged, and that even to an unwholesome extent, by their frequently recurring clothes-washings, there can scarcely be a doubt that a public washing-house would constitute, in many respects, an important convenience. Were a proper site obtained for such an establishment, it would, of course, be necessary that some mechanism should be employed to raise or draw water to it from the river. A steam-engine, adapted to this purpose, might serve also for forcing our spring water into a more elevated cistern; while the apparatus could be farther adjusted so as to heat the water for the washing-house, give warmth to the drying-room, and make provision even for a cheap establishment of public baths. If, in addition to this, we could contemplate the conducting of the surplus water, not of the cistern, because that would be filled only as required, but of the springs themselves, into a tasteful, yet inexpensive, fountain, placed in the centre of our market-place, from which again the water would flow into the sewers to cleanse and purify them, we should have here a union of usefulness, safety to health and property, economy, and elegance, such as it must be rarely possible to include under one scheme, and one superintendence. In an establishment at Liverpool, for baths and washing-house merely, the use of a tub, with warm water, and means for drying, is provided at the rate of a penny for any period under six hours; and it has been found that the average expense, exclusive, however, of that for soap, amounts to less than a halfpenny for every dozen of articles of clothing.

Public Wash-
ing-house.

It would seem to me an omission, were I to conclude these observations without lamenting that spirit of exclusiveness which is now extending itself in too many quarters, and which tends daily, more and more, to hem in the population of our towns upon their streets and the high-ways, or limits them, for their recreations, to the newspaper and the tavern. Light is itself an important element of life, and there can be no perfection of health without cheerful and vigorous exercise in the open air. If our rulers are content that all active pastimes should remain the prerogative of the rich only, the time may assuredly come, when they will be eager to look around for hardy defenders of the liberty and property of the country, and will meet everywhere with a population of sallow and moody thinkers, who have lost all relish for strenuous bodily exertion, and have become more dangerous to our own laws than to any enemy that may attack us. I trust, therefore, that one part of the present sanitary movement, which aims at the provision of large open spaces near our towns, for recreation and manly exercises, will not be considered unworthy of attention. However confident the nation may be in its present strength and resources, it would be

Exercise and
Recreation.

worse than imprudent if it spared any effort to cherish and maintain them; especially where such efforts could be made in a humane and kindly spirit towards those extensive classes, the nature of whose protracted toils places them most in need of some pure and healthful relaxation.

I have thus endeavoured to lay before you a connected view of the main features in the general condition of the town, with reference to all the more prominent points of a sanitary enquiry. I shall not apologize for the length of my observations, because I am conscious that those who take an instructed interest in the subject will discover more cause to blame me for my defects and my omissions, than for any extraneous matters which they may believe me to have introduced. The details, throughout, have been attempted to be arranged with sufficient distinctness, to render it easy to separate that which is really essential and practical, from that which is merely accessory and explanatory; and they are now left to those earnest and intelligent minds, who may be willing, here as elsewhere, to grapple with the weighty influences which they unquestionably involve. It would be vain, in such matters, to attempt to read God's will otherwise, than through the results of his natural laws: and if it has been proved, that, in the proportion that these laws are habitually slighted or obeyed, we have, as at least a probability, on the one hand misery and premature death, and on the other a gentle and late decay, with that gradual loosening of all ties, and deadening of all senses, which seems designed as the fitting close of an existence to which we have ceased to be adapted, these are assuredly truths which it must be religion to promulgate, and upon which it cannot be possible to insist too strongly.

Permanent Sanitary Committee.

Let me add, that in several of the towns of England, it has been usual, of late, for the Corporation or Council to select a few of their number, to serve as a permanent Sanitary Committee; a practice which is designed to be useful in preserving those improvements which a first effort may easily create, but which only a continued watchful superintendence can steadily maintain. Perhaps, this arrangement also you may consider it prudent to adopt.

I have the honour to be,

Gentlemen,

Your most obedient Servant,

CHARLES WILSON, M.D.

Neworth,
Kelso, 24th Dec., 1847.